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Network of Consulting Actuaries UK

# Machine Learning for Actuaries

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# Agenda

1. Introductions
2. Machine learning and the IFoA
3. Modelling Analytics and Insights from Data
4. Practical Machine Learning
5. The actuary as a data scientist?
6. Final Thoughts

The views expressed in this presentation are those of the presenters



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# Introductions

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## Valerie du Preez

### Life Insurance Actuary

Specialising in actuarial finance and risk. Embracing Insurtech.

Opinions my own.

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## Rachael McNaughton

### Data Scientist

Specialising in the application of machine learning techniques to insurance applications.

Opinions my own.

Members of Modelling, Analytics and Insight from Data (MAID) working group, working on applying new techniques to traditional actuarial areas

MAID now replaced with **Data Science member interest group**



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# Machine Learning and the IFoA

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# Some of the IFoA's Initiatives

**1** Modelling Analytics and Insights from Data (MAID)

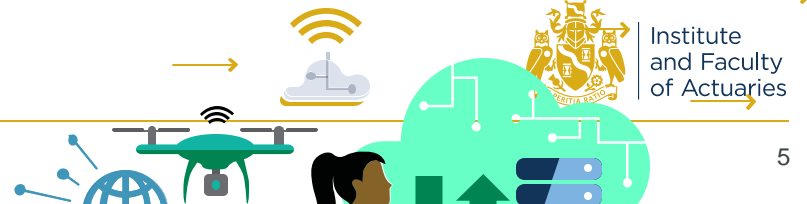
**2** Member Interest Group

**3** Lifelong Learning

**4** Collaboration with RSS

**5** The actuary as a data scientist?

Others....





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# Modelling Analytics and Insights from Data

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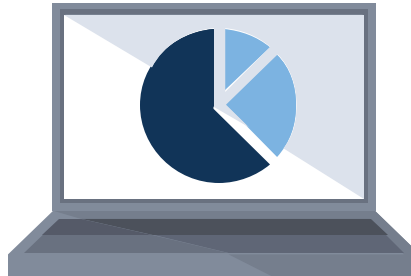
# Working Party Overview

Research

New approaches

New Areas

Professional implications



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# Key questions for members

1

What aspects of data science do all actuaries need to know about?

2

What is data science bringing for actuaries?

3

What are actuaries bringing to data science?

4

What should the IFoA do to support its members in learning about data science?







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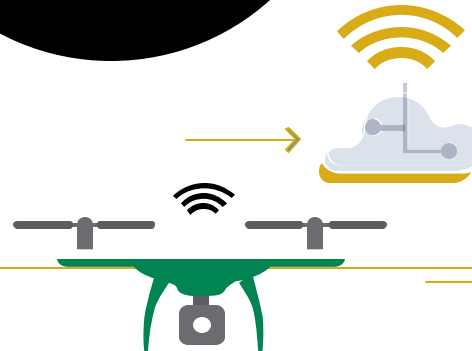
# Practical Machine Learning

# The data challenge

**New forms  
of data**

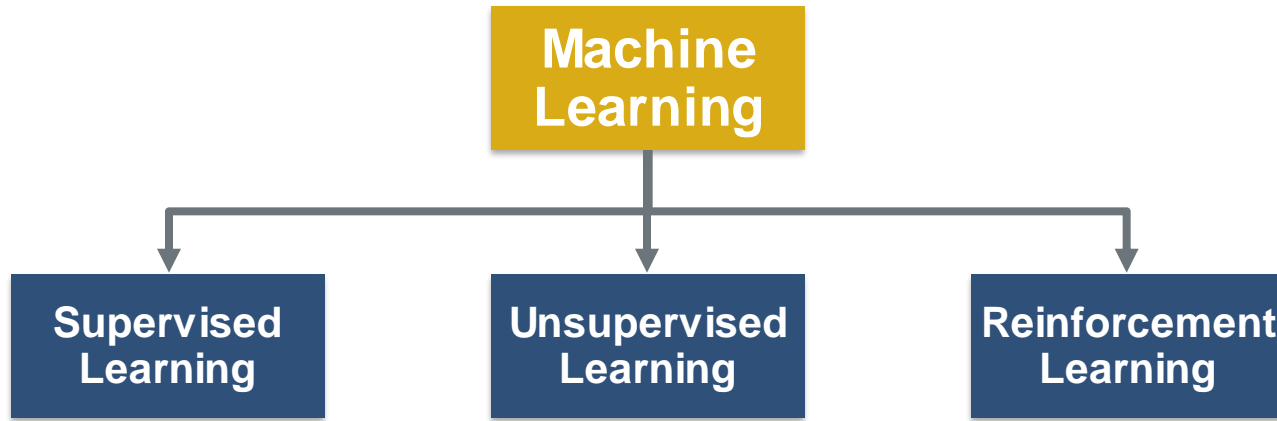
**New types  
of model**

**New forms  
of analysis**



# Machine Learning

**Wikipedia:** “Machine learning is a field of computer science that gives computers the ability to learn without being explicitly programmed. Machine learning is closely related to (and often overlaps with) computational statistics, which also focuses on prediction-making through the use of computers.”

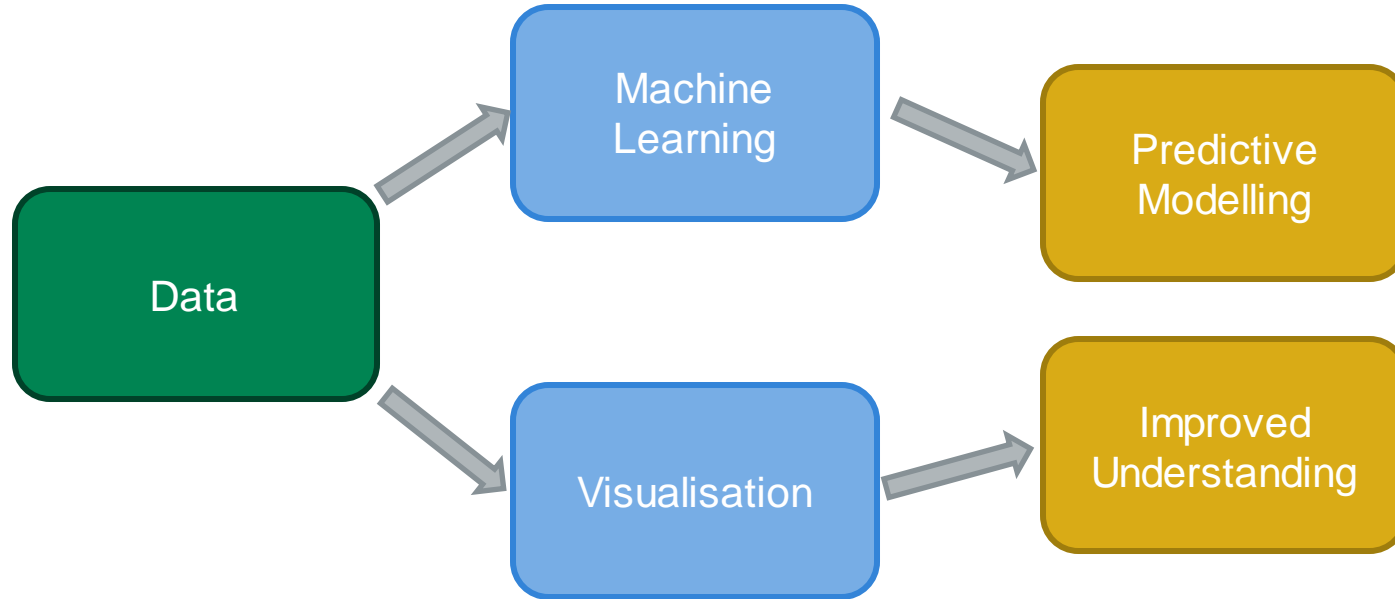




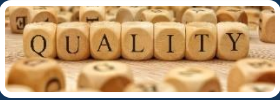
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## The Actuary as a Data Scientist?

# Data Science



# Data Science Benefits to Actuaries



## Improved Data Quality

- A key driver for companies to improve data capture and storage



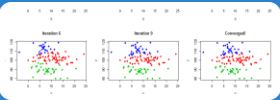
## New Data Sources

- Opportunities for actuaries to explore alternative data sources



## Speed of Analysis

- Machine learning models can generally be fitted and validated quickly



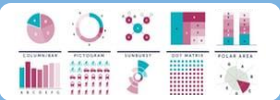
## New Modelling Techniques

- Alternative modelling approaches allows different perspectives to be gained on data



## New Approaches to Problems

- Wider variety of models quickly - select the best model technique for a given problem

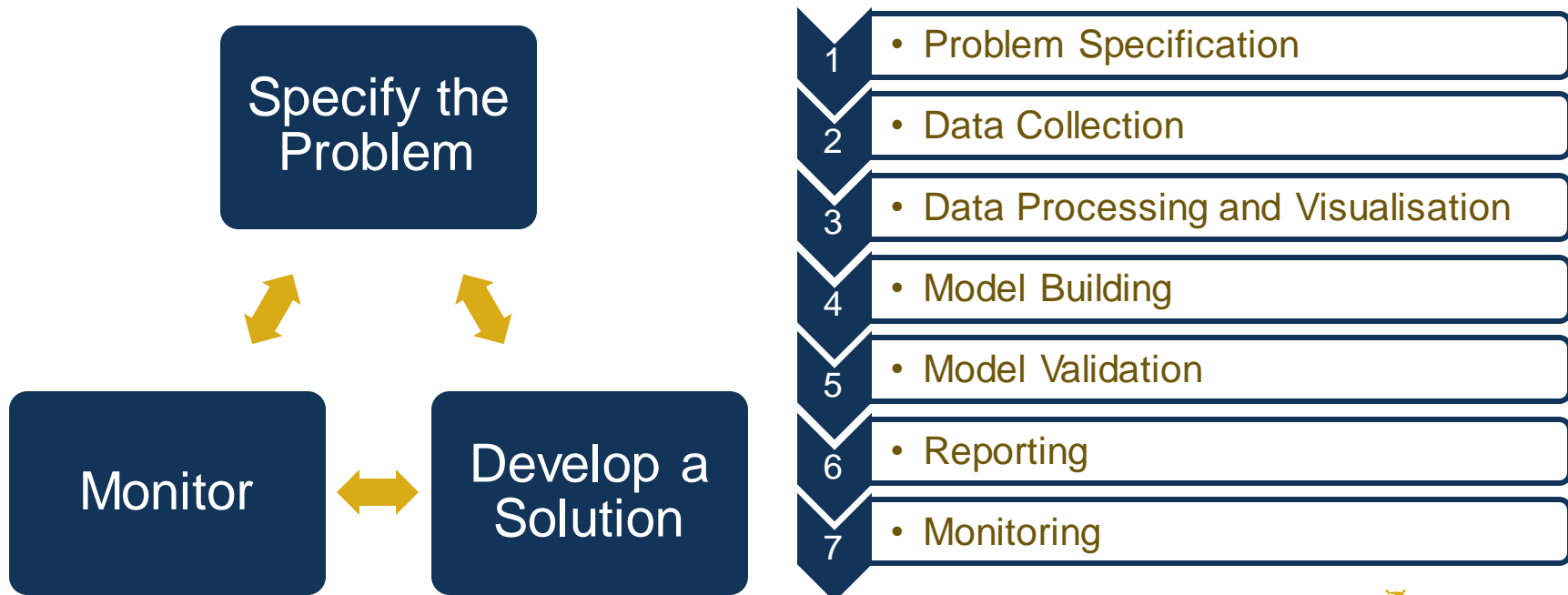


## Improved Data Visualisations

- Stunning visualisations of data which can itself provide new perspectives on a task



# Actuarial Control Cycle vs Data Science Process







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# Final Thoughts

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# Practical Considerations



- |               |   |
|---------------|---|
| Data Cleaning | <ul style="list-style-type: none"><li>• Biggest time saving</li><li>• Biggest modelling gains</li></ul> |
| Documentation | <ul style="list-style-type: none"><li>• Audit trail vital</li><li>• Often overlooked</li></ul>          |
| Review        | <ul style="list-style-type: none"><li>• Full review of code vs testing of final model</li></ul>         |



# Data Science Risks

## Macro Risks

- Widening inequality as a result of automation
- Not enough junior staff being trained
- New staff unfamiliar with ‘the basics’
- Increased risk of data breaches – GDPR

## Micro Risks

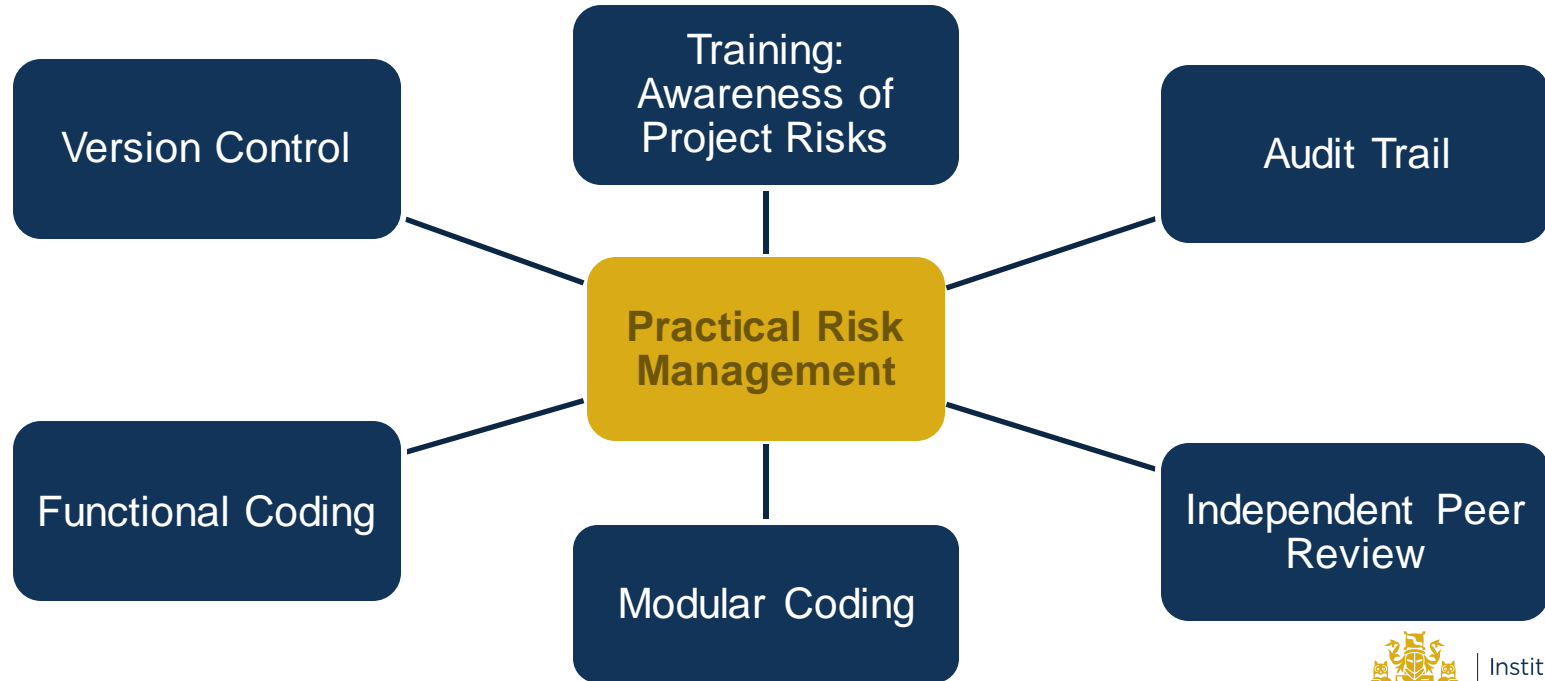
- Building models which are poorly understood
- Actuarial models built by individuals with little / no actuarial knowledge
- Using incorrect, inappropriate or otherwise flawed data
- Actuaries reviewing coded models vs spreadsheet
- Models appraised out of context

Algorithmic Risks



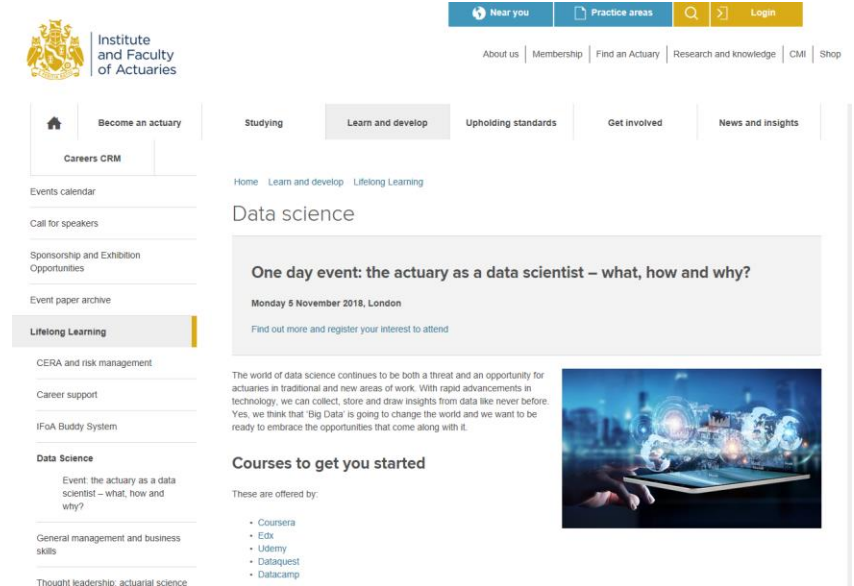
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# Data Science Risk Management



# Upskilling

- Practise!
- Lots of code and examples online
- ‘Point and click’ software available
- Data science member interest group
- IFoA lifelong learning area



The screenshot shows the Institute and Faculty of Actuaries website. The header includes the logo and navigation links: 'Near you', 'Practice areas', 'Search', and 'Login'. Below the header, there are tabs for 'Study', 'Learn and develop', 'Upholding standards', 'Get involved', and 'News and insights'. The 'Learn and develop' tab is active, showing a 'Data science' section. This section features a 'One day event: the actuary as a data scientist – what, how and why?' scheduled for Monday 5 November 2018, London. Below the event information, there is a paragraph about the world of data science and a list of courses to get started, including Coursera, Edx, Udemy, Dataquest, and Datacamp. The 'Lifelong Learning' section on the left lists various resources like 'CERA and risk management', 'Career support', 'IFoA Buddy System', and 'Data Science'.

# Questions

# Comments

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